The "Beaverhill Butterfly Observatory"? A Butterfly Survey at the BBO, Summer 2013

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Introduction

Butterfly surveys have been conducted at Beaverhill Lake, near Tofield, Alberta, since at least the 1970s (Thormin 1977) and were nearly an annual occurrence between 1995 and 2002 (Flockhart 2002; Swengel & Swengel 2003). This paper describes the most recent butterfly survey at Beaverhill Lake, which was conducted during the summer of 2013. Twenty three species were observed, including two that were new for the area. Preliminary work on the local phenology of three of the most common species is presented. Potential future directions for butterfly research at the Beaverhill Bird Observatory are also discussed.

Methods

A variety of routes in the vicinity of the Beaverhill Bird Observatory were walked during the summer of 2013 and the number of butterflies of each species that were observed was recorded. All routes fell within a 750 metre radius of the BBO (53.38056°N, 112.52741°W; 8 km east of Tofield, Alberta). A number of different routes were used in order to include as much habitat diversity as possible. All butterflies that could be identified were counted regardless of how far they were from the observer. Emphasis was placed on documenting species richness rather than obtaining precise numbers; in instances when there were too many butterflies to count, preference was given to recording less common species and confirming the identity of unusual individuals. All surveys were conducted by the same observer, Steve Andersen, with the exception of June 29 when a volunteer accompanied him.

At the beginning and end of each survey, the time, temperature, wind conditions, and cloud cover were recorded. Typically, surveys were not conducted if it was raining or below 15°C, due to reduced butterfly activity under these conditions. Butterflies were identified at a distance when possible, or captured using a hand net when closer inspection was required. Photographs were taken of any individuals that could not be reliably identified in the field. Whenever possible, photos were also taken of at least one member of each species recorded on a given day to allow identifications to be verified if necessary. Individuals that could not be identified and escaped capture were not recorded. Identifications were made using *Alberta Butterflies* (Bird et al. 1995), *Butterflies of Alberta* (Acorn 1993), and to a lesser extent, *Western Butterflies* (Opler, Wright 1999). All data, including representative photos, was submitted to eButterfly.ca where identifications were both vetted and subjected to the scrutiny of others.

	May 15	May 18	Jun 9	Jun 29	Jul 7	Jul 13	Jul 14	Jul 27	Aug 3	Aug 4	Aug 17	Aug 18	Aug 25	Total
European Skipper					7	20	37		4					68
Hobomok Skipper				1										1
Long Dash					1									1
Canadian Tiger Swallowtail			1	13										14
Western White												5		5
Cabbage White						1					1			2
Clouded Sulphur									2					2
Spring Azure	1													1
Greenish Blue					9		3							12
Great Spangled Fritillary						1			1	2	1			5
Aphrodite Fritillary										1				1
Mormon Fritillary											1			1
Meadow Fritillary										1			1	2
Northern Pearl Crescent				8	49	6	22						1	86
Tawny Crescent					1									1
Satyr Comma/Anglewing												1		1
Green Comma		1												1
Milbert's Tortoiseshell		1				1								2
Mourning Cloak	3								1					4
White Admiral									2	2				4
Common/Inornate Ringlet						3			1					4
Common Wood Nymph							1	8	18	4	4	5	1	41
Red-Disked Alpine	5	6												11

Table 1. Results of the 2013 butterfly surveys at the Beaverhill Bird Observatory, near Tofield, Alberta.

Observations

Surveys were conducted on 13 days during the summer of 2013 with a total of 270 individuals of 23 species recorded (Table 1). Two species, the Hobomok Skipper and the Green Comma (Figure 5), had not previously been documented at Beaverhill Lake, although both have been observed in the vicinity of Edmonton (eButterfly 2014). Kelly and Cameron also make reference to observations of Green Commas at Beaverhill Lake in 2006, but outside of their regular Pollard walks (2006).

Discussion

Two previous studies (Flockhart 2002; Kelly & Cameron 2006) were conducted at the Beaverhill Bird Observatory, in 2000 and 2006, using methods that were reasonably similar to our own. All three were based on Pollard walks (Pollard 1977) but did not place any limit on the distance from the observer within which butterflies could be counted. Flockhart did not publish his survey route, but Kelly and Cameron gave a rough description of theirs. The paths they followed all fell within the areas surveyed during the 2013 study.

The number of species observed in this study, 23, is very similar the 22 species recorded in 2000 (Table 2). The lower count of 18 species in 2006 was likely due to the much smaller number of surveys conducted that year, and in particular the absence of surveys in May. Seventeen of the species from 2013 were common to at least one of the previous surveys, and 11 were identified in all three years.

	2000	2006	2013
Number of Surveys	14	8	13
Number of Observers	1	2	1
Species Recorded	22	18	23
Individuals Recorded	649	395	270
Total Survey Time (hours)	25:53	15:23	21:45*
Sightings per Hour	25.07	25.68	12.41

Table 2. Comparison of the studies from 2000, 2006, and 2013.

With three seasons' worth of data, it is possible to produce rough estimates of when some of the more common species are present at the BBO. For example, Canadian Tiger Swallowtails are typically present throughout the month of June (Figure 1), Northern Pearl Crescents are on site from late June until the end of July, and sometimes well into August (Figure 2), and Common Wood Nymphs show up in mid July and drop off between mid and late August (Figure 3). These time frames are only approximate and as the data set grows they will be refined to better incorporate annual variations. At this time, there is insufficient data to make similar estimates for most of the other species known to occur at the BBO. For example, despite having a reasonable number of Cabbage White sightings, trends in their data are much less clear (Figure 4). This is likely due in part to the ability of Cabbage Whites to produce multiple broods per year (Bird et al. 1995; Flockhart 2002). Other species lack enough sightings to produce meaningful graphs.

In order to compensate for differences in search effort between studies, Figures 1 – 4 illustrate the percentage of individuals observed on a given day (relative to the total number recorded that year) rather than the absolute number observed. This method works well for common species with many observations, but in years where the total number of individuals observed is small or the number of days on which they are seen is minimal, it can place undue emphasis on some data points.

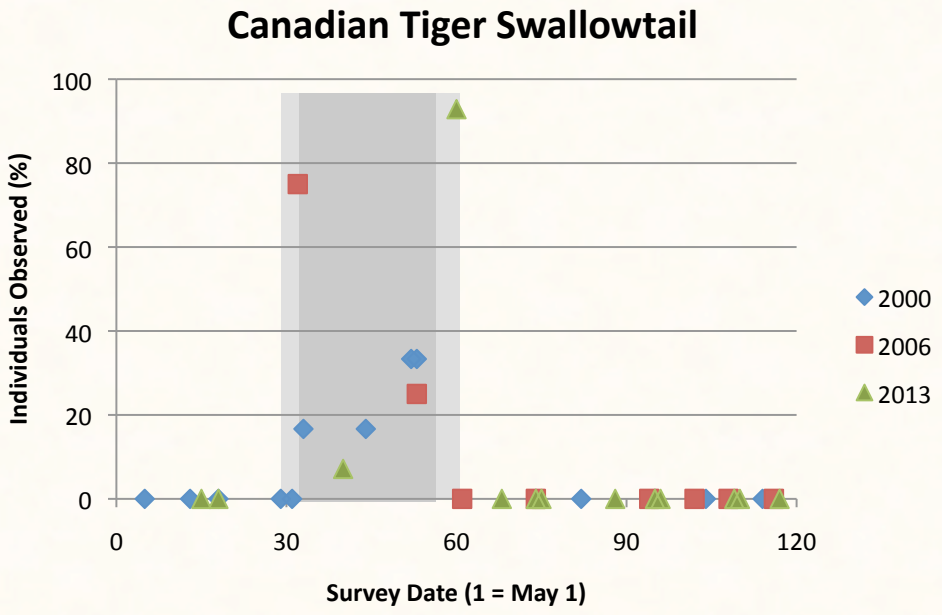

Figure 1. Timing of Canadian Tiger Swallowtail observations at the BBO (2000: n=6, 2006: n=4, 2013, n= 14).

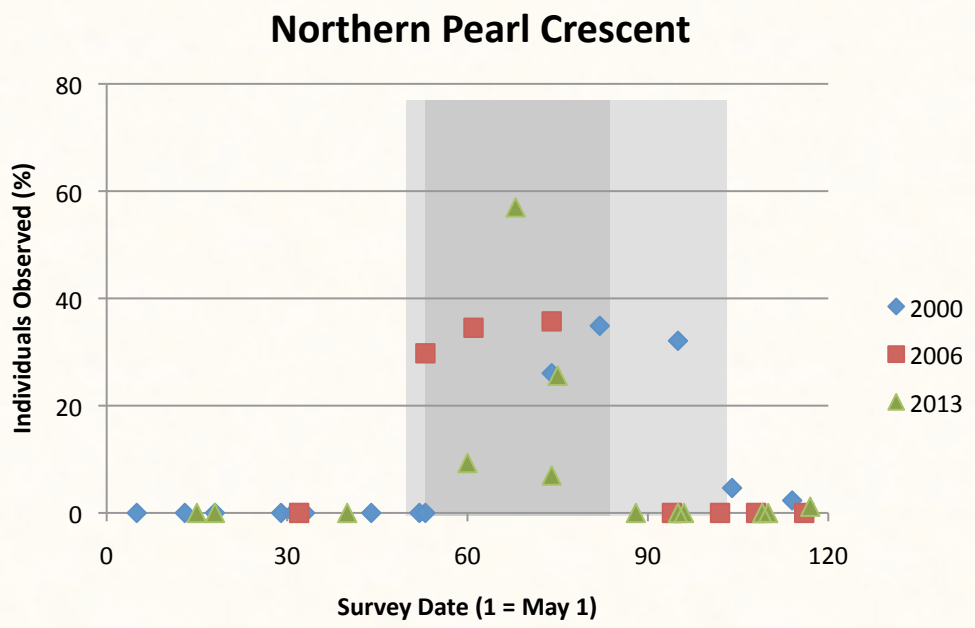

Figure 2. Timing of Northern Pearl Crescent observations at the BBO (2000: n=215, 2006: n=84, 2013, n= 86).

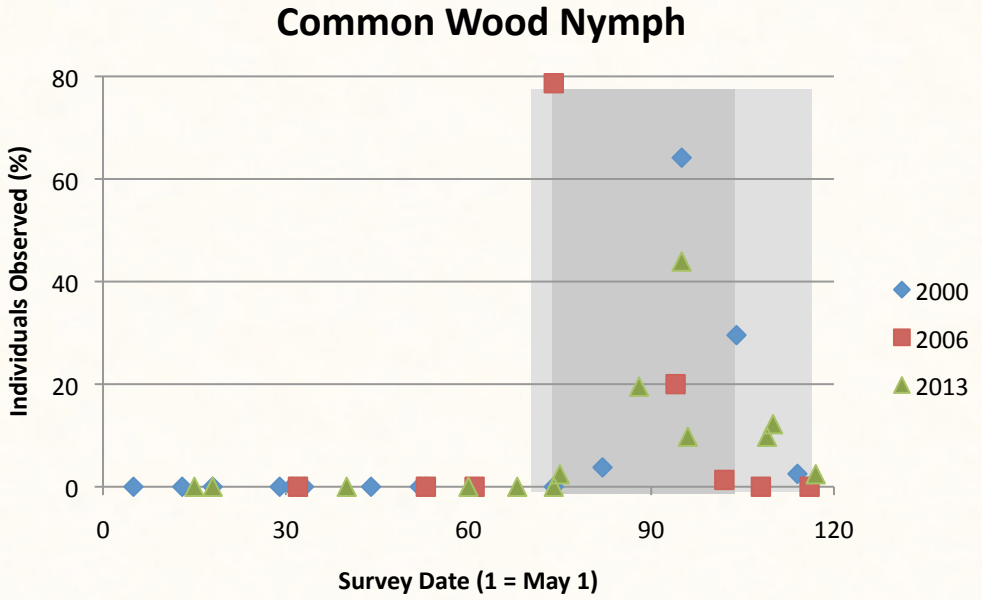

Figure 3. Timing of Common Wood Nymph observations at the BBO (2000: n=159, 2006: n=75, 2013, n= 41).

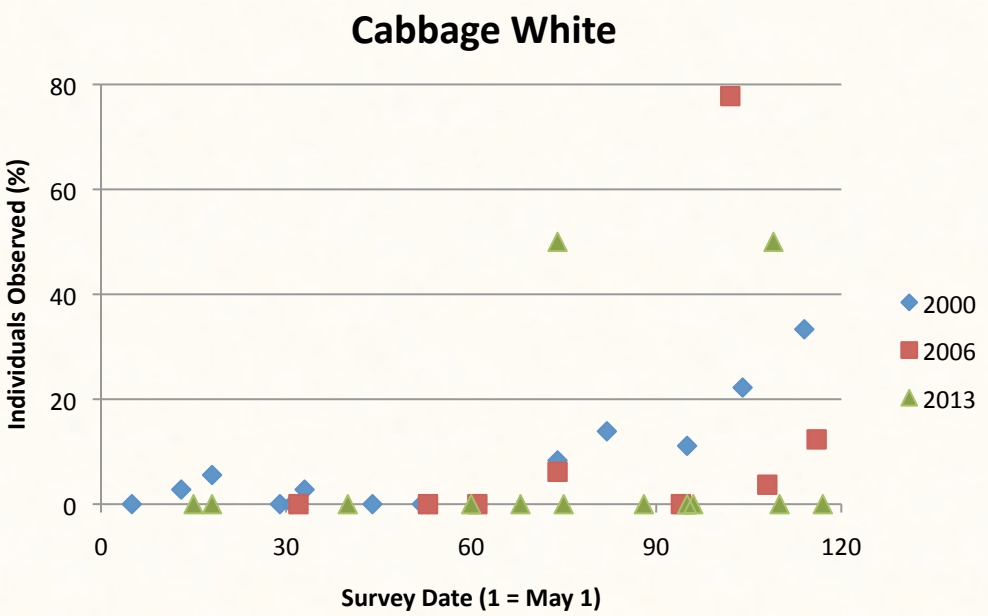

Figure 4. Timing of Cabbage White observations at the BBO (2000: n=36, 2006: n=81, 2013, n= 2).

One prominent difference between the 2013 study and those from previous years is the sharp decline in the number of sightings per hour, with the 2013 value approximately half that of previous years (Table 2). The main cause of this was probably the time spent photographing butterflies, which had not previously been undertaken. Uploading the photographs and associated data to eButterfly was valuable as it allowed the work of volunteers to be vetted by experienced entomologists. It also enables identifications to be re-evaluated at a later date if necessary and makes the data available to other researchers. With that said, in future it would be advisable to reduce the time spent taking photos in order to increase the number of individuals observed. This should improve the number of rare species observed and provide a more precise picture of the phenology of local species.

Caveats

Some fairly substantial holes exist in this year's data set. In particular there are two 3-week gaps, in late May and mid-June. The unusually rainy weather, and the authors' limited availability, both contributed to producing these gaps. It must be assumed that some species were missed during these times. Surveying began on May 15 and ended on August 25, meaning that the beginning and end of the butterfly season were also missed.

While it is tempting to make comparisons of the abundance of butterflies between years, this would be quite challenging. The routes surveyed, amount of time spent surveying, expertise of observers, and number of observers all varied from year to year.

Future Work

Several interesting questions could be examined if it were possible to better compare butterfly data among years. Over time, the size of Beaverhill Lake itself varies greatly. Not long ago, it was nearly 20 km across; today it is all but gone (Figure 6). The effect of these fluctuations on local butterfly populations is worth exploring. The impacts of climate change over the coming decades are likely to precipitate wide-ranging changes to local flora and fauna. These could also be observed in the BBO's butterfly data. Examining these long-term trends would be much easier if a standardized monitoring protocol were in place.

Another project that could be undertaken would be to determine the optimal frequency for conducting surveys. Ten of the 23 species identified this year were observed during only a single survey. There are also 34 species that were seen in the past but not recorded in 2013. This suggests that surveys may not have been of sufficient frequency to capture all the species diversity present at the site. If it were possible to conduct surveys more than once per week over the course of a summer, the higher resolution data would give a better sense of how frequent surveys need to be in order to detect all the species that are present. It would also give a clear picture of emergence/arrival times for each species and provide an excellent baseline from which future researchers could work. However, the size of this task would likely require the efforts of several volunteers.

At the time of publication, the BBO was in the process of developing a standardized butterfly monitoring protocol with guidelines defining what information to collect and survey routes to follow. This will help ensure that future surveys methodologies are consistent and generate data that can more easily be compared across years.

Conclusions

The individual species observed, and the overall species richness in 2013 were quite similar to previous years. There is now sufficient data to produce preliminary estimates of when some of the more common butterflies are present at the Beaverhill Bird Observatory, but for most species more data collection will be required. The large number of species that were observed during only a single survey in 2013 suggest that more frequent surveying may be needed in future to capture the full diversity present in the study area.

Acknowledgements

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Figure 5. Voucher photos of Hobomok Skipper (*Poanes hobomok*) and Green Comma (*Polygonia faunus*), as submitted to eButterfly.ca. Both photos by Steve Andersen, and both taken at the BBO.

Literature Cited

Acorn, John. 1993. Butterflies of Alberta. Lone Pine Publishing, Edmonton, Alberta.

Bird, CD; GJ Hilchie; NG Kondla; EM Pike; FAH Sperling. 1995. Alberta Butterflies. The Provincial Museum of Alberta, Edmonton, Alberta.

eButterfly. 2014. eButterfly. Accessed April 14, 2014. http://e-butterfly.org

Flockhart, DTT. 2002. The Butterfly Fauna of Beaverhill Lake, AB. Blue Jay 60 (2): 93-106.

Kelly, A, and K Cameron. [2006.] [Butterfly Observations at Beaverhill Lake, AB.] Unpublished data.

Opler, PA, and AB Wright. 1999. Western Butterflies. Houghton Mifflin Company, New York, New York.

Pollard, E. 1977. A Method for Assessing Changes in the Abundance of Butterflies. Biological Conservation 12(2): 115-134.

Swengel, AB, and SR Swengel. 2003. NABA Butterfly Counts, 2002 Report. North American Butterfly Association Inc., Morristown, NJ. p 11.

Thormin, TW. 1977. The Butterflies of Beaverhill Lake. The Edmonton Naturalist 5: 160-163.

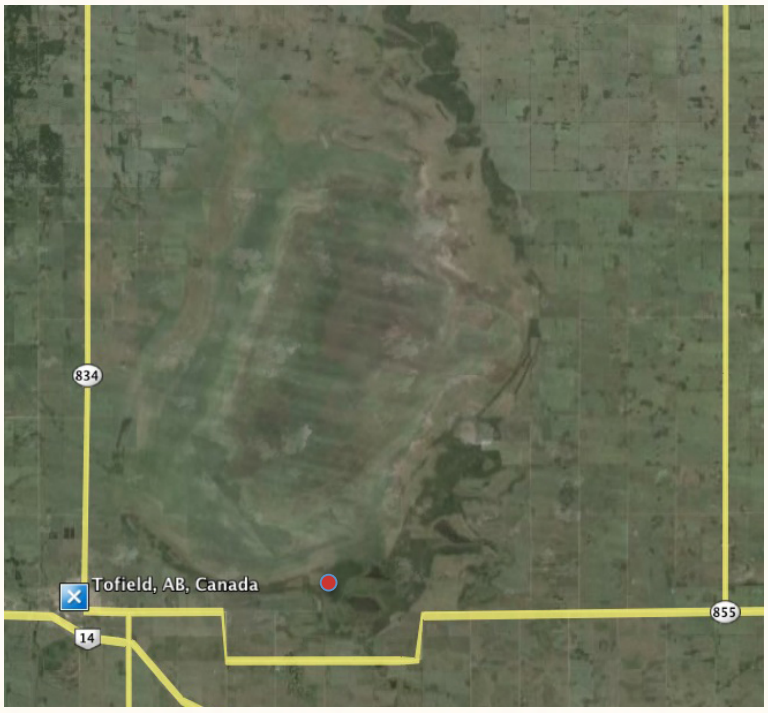

Figure 6. The dry bed of Beaverhill Lake on Google Earth, April 10, 2013. Red dot shows approximate location of the BBO.